Factoring

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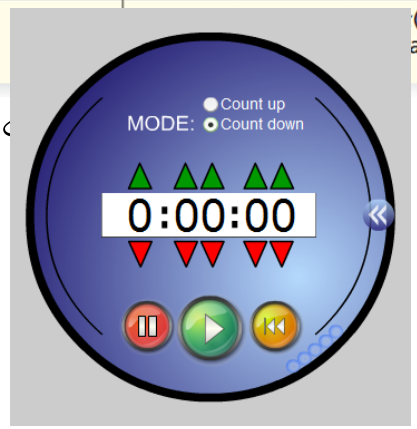
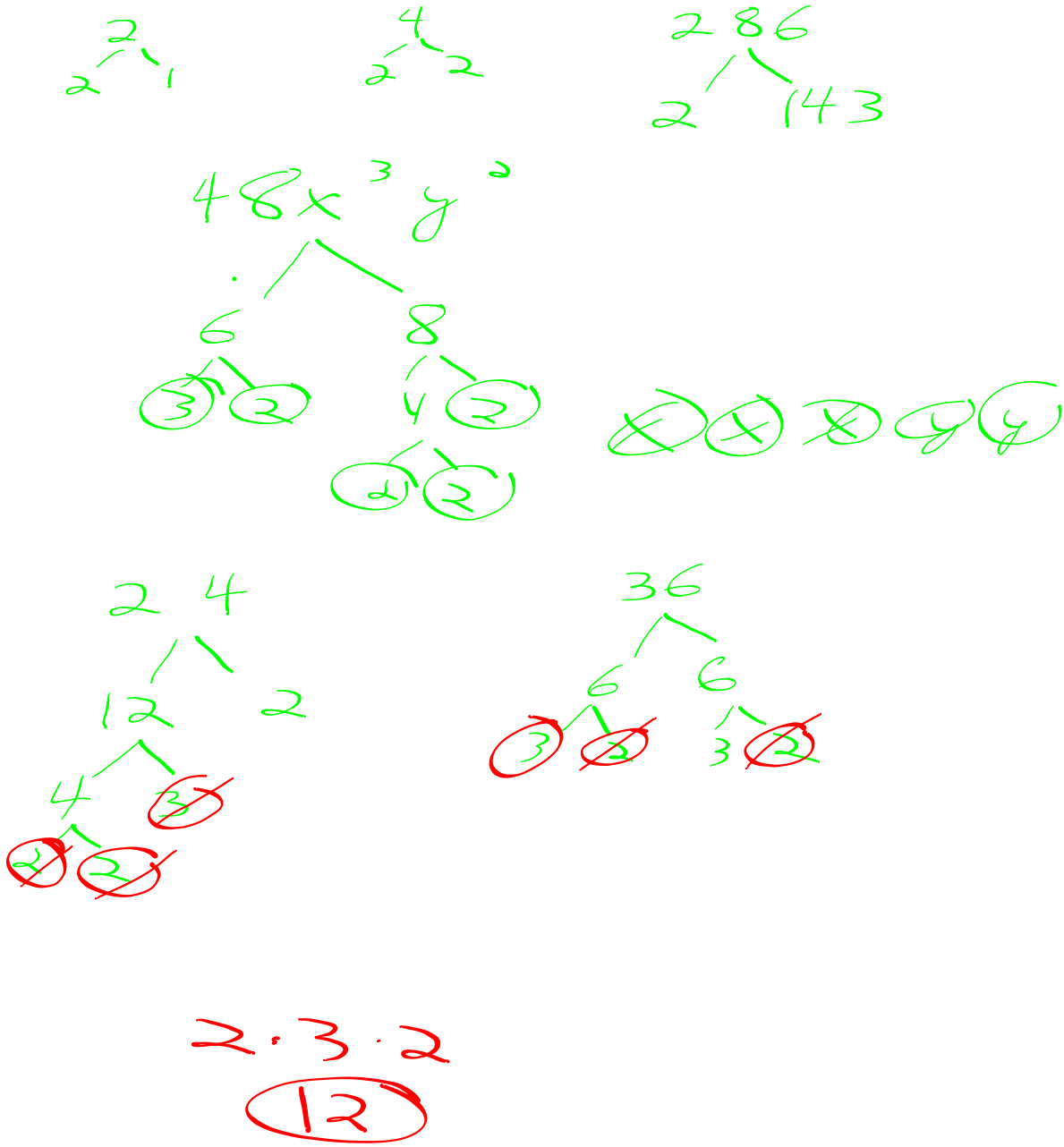
Concept Summary — *Factoring Techniques*

Number of Terms	Factoring Technique	General Case
any number	Greatest Common Factor (GCF)	$a^3b^2 + 2a^2b - 4ab^2 = ab(a^2b + 2a - 4b)$
two	Difference of Two Squares Sum of Two Cubes Difference of Two Cubes	$a^2 - b^2 = (a + b)(a - b)$ $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
three	Perfect Square Trinomials	$a^2 + 2ab + b^2 = (a + b)^2$ $a^2 - 2ab + b^2 = (a - b)^2$
	General Trinomials	$acx^2 + (ad + bc)x + bd = (ax + b)(cx + d)$
four or more	Grouping	$(a + b) + y(a + b)$ $a + b)(x + y)$

page 23




2 1
2
4 2
2
286
2 143
48x³y²
6 8
3 2 4 2
2 2
x x x y y
2 4
12 2
4 3
2 2
36
6 6
3 2 3 2
2·3·2
12

Ex 1. Factor $6x^2y^2 - 2xy^2 + 6x^3y$

GCF:

$2 \cdot 3 \cdot x \cdot x \cdot y \cdot y - 2 \cdot x \cdot y \cdot y + 2 \cdot 3 \cdot x \cdot x \cdot x \cdot y$

$2 \cdot 3 \cdot x \cdot x \cdot y \cdot y - 2 \cdot x \cdot y \cdot y + 2 \cdot 3 \cdot x \cdot x \cdot x \cdot y$

$$\boxed{2xy(3xy - y + 3x^2)}$$

Ex 2) $10a^3b^2 + 15a^2b - 5ab^3$

$2 \cdot 5 \cdot a \cdot a \cdot a \cdot b \cdot b + 5 \cdot 3 \cdot a \cdot a \cdot b - 5 \cdot a \cdot b \cdot b \cdot b$

$2 \cdot 5 \cdot a \cdot a \cdot a \cdot b \cdot b + 5 \cdot 3 \cdot a \cdot a \cdot b - 5 \cdot a \cdot b \cdot b \cdot b$

$$\boxed{5ab(2a^2b + 3a - b^2)}$$

Ex 3. Factor: $a^3 - 4a^2 + 3a - 12$

"Grouping"

$$(a^3 - 4a^2) + (3a - 12)$$

$$a \cdot a \cdot a - 2 \cdot 2 \cdot a \cdot a$$

$$a^2(a-4) + 3(a-4)$$

$$\boxed{(a^2+3)(a-4)}$$

6

Ex 4. $x^3+5x^2-2x-10$

"Grouping please :)"

$-2(x+5)$
$-2x-10$

$(x^3+5x^2)+(-2x-10)$

$x^2(x+5)+-2(x+5)$

$\boxed{(x^2-2)(x+5)}$

Ex 5. Factor $3xy^2 - 48x$

$y^2 + 0y - 16$

$3x(y^2 - 16)$

$\boxed{3x(y+4)(y-4)}$

Step 1: Factor by GCF

Step 2: Factor by Special Products "difference of squares"

5b.) $5mp^2 - 45m$

$5m(p^2 - 9)$

$\boxed{5m(p-3)(p+3)}$

Ex 6.) $c^3d^3 + 27$

$(cd)^3 + (3)^3$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$(cd+3)((cd)^2 - cd \cdot 3 + 3^2)$

$\boxed{(cd+3)(c^2d^2 - 3cd + 9)}$

6b.) $x^3y^3 + 8$

$(xy)^3 + (2)^3$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$(xy+2)((xy)^2 - xy \cdot 2 + 2^2)$

$\boxed{(xy+2)(x^2y^2 - 2xy + 4)}$

Ex 7. $m^6 - p^6$

Two ways...

Rewrite: $(m^3)^2 - (p^3)^2$ $\quad (m^2)^3 - (p^2)^3$

$(m^3)^2 - (p^3)^2$

$a^2 - b^2$

$(a+b)(a-b)$

$(m^3 + p^3)(m^3 - p^3)$

Sum of cubes

Difference of cubes

$$\boxed{(m+p)(m^2 - mp + p^2)(m-p)(m^2 + mp + p^2)}$$

7b.) $64x^6 - y^6$

Ex 8. Simply $\dfrac{x^2+2x-3}{x^2+7x+12}$

Factor

$$\frac{(x+3)(x-1)}{(x+4)(x+3)}$$

$$\frac{\cancel{(x+3)}(x-1)}{(x+4)\cancel{(x+3)}}$$

$$\boxed{\frac{x-1}{x+4}}$$

$\dfrac{24}{36}$

Factor

$\dfrac{\cancel{2}\cdot\cancel{2}\cdot\cancel{3}\cdot 2}{\cancel{3}\cdot 3\cdot\cancel{2}\cdot\cancel{2}}$

$\dfrac{2}{3}$

homework page 242-244

Due Monday, December 5th

#16-38 even

#46-50 even

#63-69 odd

EC (1pt each): 39-45

Front: $5x^2 - 13x + 6$

Factor

Back: $3y^2 - 2y - 5$

$5x^2 - 13x + 6$

$5 \cdot 6$
$\shortparallel$
30

$-3 \quad -10$

-13

$5x^2 - 3x - 10x + 6$

$(5x^2 - 3x) + (-10x + 6)$

$x(5x - 3) + -2(5x - 3)$

$\boxed{(x - 2)(5x - 3)}$

$3y^2 - 2y - 5$

$-1 \quad 5$

$-5 \quad 3$

-2

$(3y^2 - 5y) + (3y - 5)$

$y(3y - 5) + 1(3y - 5)$

$\boxed{(y+1)(3y-5)}$